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ABSTRACT

Group decision support systems (GDDS) represent a technological aid for the decision-making process, combining communication, computers, and decision technologies to support problem formulation and solution in group meetings. A study examined communicative influence strategies used in a GDDS meeting. Subjects, 201 high- and low-influence persons from 28 intact groups were assessed on frequency and distribution of communicative influence strategies in a group decision support system meeting where all participants followed the same set of procedures. Among the groups were faculty/administrative departments, student clubs and organizations, and classes. Results indicated that high-influence users employed more words, strings, and acts. Additionally, high-influence individuals used more justifications and questions while low-influence members interacted with more statements and suggestions. (Three tables of data are included and 45 references are attached.) (Author/SR)

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Communicative Influence Strategies in a Group Decision Support System Meeting

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Abstract

Two hundred one high- and low-influence subjects from 28 intact groups were assessed on frequency and distribution of communicative influence strategies in a group decision support system (GDSS) meeting. Results suggest that high- and low-influence members differ in their use of communicative influence strategies in a GDSS meeting. Specifically, high-influence users employed more words, strings, and acts. Additionally, high-influence individuals used more justifications and questions while low-influence members interacted with more statements and suggestions. The paper offers a coding scheme for identifying influence strategies in computer-mediated decision making and directions for future research are discussed.

Communicative Influence Strategies in a Group Decision Support System Meeting

The search for ways to improve meeting efficiency and group decision making continues to be of great importance, as the time organizational members spend in decision-related meetings is substantial (Dennis, George, Jessup, Nunamaker, & Vogel, 1988; Huber, 1984; Stefik et al., 1987). As Putnam (1983) noted, the small group is an essential part of the organization. Indeed, the success of virtually any organization is dependent on the quality of its decision-making groups.

Group decision support systems (GDSSs) represent a technological aid for the decision-making process. GDSSs combine communication, computer, and decision technologies to support problem formulation and solution in group meetings (DeSanctis & Gallupe, 1987; Watson, DeSanctis, & Poole, 1988). Although the exact effects of a GDSS on groups and their members still remain largely unknown, one of the barriers that a GDSS may overcome is the amount of influence any one individual possesses. This feature is key to those organizations attempting to involve multiple individuals in the decision-making process.

All groups have influential members (Falk & Falk, 1981; Hirokawa & Pace, 1983). How these members with varying degrees of influence communicate on a system

designed to equalize influence should be of interest to researchers and group members alike. Hirokawa and Pace pointed to the impact of influential group members as being one of the four distinctions between effective and ineffective groups. DeSanctis and Gallupe (1987) pointed specifically to this variable as an important area for future research. Focusing on just the GDSS and looking at differences between individual members within the same groups can add new insights that have yet to be closely examined. Additionally, very little is known about the nature of the communication strategies that are used to influence others in a computer-mediated setting.

The study described in this paper is part of a larger experiment that examined group member differences on the variable of influence in a GDSS meeting within a communication-based framework. Specifically, this paper reports on communicative influence strategies used in a GDSS meeting. It begins by discussing the theory in which it is framed and then briefly reviews relevant literature on group process and GDSSs. The methodology used in this study is then explained, with results following. Finally, conclusions are drawn, limitations are noted, and directions for future research are discussed.

Theoretical Framework

Since the goal of a GDSS is to aid in the group

decision-making process, it is necessary to frame the current study in a theory of group process and outcomes. McGrath's (1984) conceptual framework for the study of groups provides a useful model for examining the variables of interest in the current study. The centerpiece of the model is the group interaction process, that is, communicative behavior. According to the model there are four major forces that shape behavior: (a) characteristics of the group task, (b) pattern of relationships among group members prior to interaction, (c) environment in which the group meets, and (d) individual properties of group members. This research controls for task, prior patterns of relationship among group members, and environment, while examining individual differences as a function of influence.

Review of Literature

Group Process

Groups. Fisher and Ellis (1990) offered the following definition of group: "three or more individuals whose communicative behaviors become interstructured and repetitive in the form of predictable patterns" (p. 22). Fisher (1974) pointed out that task groups refer to a large variety of groups who perform some task function. As he stated, "The task-oriented group is by far the most prevalent group in our society. Every human organization--

business, educational, service, and political--includes numerous task-oriented groups to carry out the various functions of the organization..." (p. 10). Steiner (1979) added that task groups are "small sets of people who influence one another through direct, generally face to face contacts" (p. 11). Task groups may be used to harmonize and coordinate individual efforts and are often involved in decision-making activities.

Influence. One of the most central characteristics of group process is influence, which is based on personal characteristics and is directly tied to the personal relationships between group members. Instead of relying on roles, rules, and structure, influence rests upon relationship characteristics. Additionally, Forsythe (1990) noted that anonymity, group cohesiveness and longevity, and concern for accuracy may all affect influence.

Lippitt, Polansky, Redl, and Rosen (1968) studied social influence in groups of children. Persons with "high power" were the targets of more deferential approval seeking behaviors than were low power members. Group members were more likely to accept influence attempts from high power members. High power members initiated more comments and more directive social influence attempts.

In a similar vein, Hurwitz, Zander, and Hymovitch (1968) rated people as to their level of influence in a group. They found that high influence members communicated more and received more communication than low-influence members.

Hare (1976) concluded on the basis of prior research that the more one attempts to influence others, the more he or she will be successful. Falk and Falk (1981) concluded that low influence members participate less and make fewer influence attempts than do high influence members.

Communicative strategies. Several researchers have attempted to categorize the types of communication displayed in group interaction. Bales (1950) Interaction Process Analysis provides twelve categories describing group behavior: shows solidarity, shows tension release, agrees, gives suggestion, gives opinion, gives orientation, asks for orientation, asks for opinion, asks for suggestion, disagrees, shows tension, and shows antagonism.

Crowell and Scheidel (1961) claimed to focus on the progression of group discussion and made finer distinctions than had Bales. These researchers used complex categories that initially classified a discussion unit as an assertion (further defined as information or inference, substantive or procedural, and volunteered or requested), imperative, question (further defined as information or inference,

substantive or procedural), assertion-question, delayed relationship, and delayed self relationship. Assertions and questions were classified in substantially more detail, indicating the complexity of group discussion.

Putnam's (1981) use of procedural statements, which are metamessages directing group activity, may also be used as a way to classify verbal interaction. Her scheme includes (a) procedural direction, (b) group goals, (c) summaries and integration, (d) task implementation, (e) digressions, (f) topic changes: abstract label, (g) continue discussion: abstract label, (h) topic change: detailed issue, and (i) continue discussion: detailed topic.

Finally, compliance gaining strategies would appear to contain communicative influence strategies. One of the more notable classifications of such messages has been put forth by Wiseman and Schenck-Hamlin (1981). They developed a fourteen item taxonomy including ingratiation, promise, debt, esteem, allurement, aversive stimulation, threat, guilt, warning, altruism, direct request, explanation, hinting, and deceit.

Group Decision Support System

Description. Huber (1984, p. 195) defined a GDSS as "a set of software, hardware, and language components and procedures that support a group of people in a decision-

related meeting." DeSanctis and Gallupe (1985, p. 191) defined it as "an interactive computer-based system, which facilitates solution of unstructured problems by a set of decision-makers working together as a group." Watson (1987, p. 1) offered a definition of GDSSs as a combination of "computer, communication, and decision-support technologies to support decision-making teams." The primary purpose of a GDSS is to improve group decision making and effectiveness by removing communication barriers, providing structuring techniques for decision analysis, and systematically directing the pattern, timing, and content of group discussions (DeSanctis & Gallupe, 1987).

Influence. Often operationalized as a measure of influence, participation has been one of the most widely examined variables in GDSS studies. However, it has been studied as an outcome of GDSS meetings, rather than an independent variable going into the meeting (see, for example, Beauclair, 1987; A. Easton, 1988; G. Easton, 1988; Lewis, 1982; Jarvenpaa, Rao, and Huber, 1988; Watson, 1987). Even Zigurs (1987; Zigurs, Poole, & DeSanctis, 1988), who has been one of the few researchers to measure influence directly, used it as an outcome variable.

Communicative strategies. Zigurs' (1987; Zigurs et al., 1988) work appears to be the only example of GDSS

research that has attempted to categorize the actual communicative strategies used to influence group interaction. Using a selection of Putnam's (1981) procedural statements categorization, coders classified comments from the GDSS transcript into one of the five classifications with which Zigurs was concerned. She determined that computer-supported groups did use more procedural messages than manual group. However, no differences between individual GDSS users nor differences on specific message categories were reported.

In a different, but related vein, are the attempts to examine the unique nature of computer-mediated communication. Smolensky, Carmody, and Holcomb (1990) point out that computer-mediated communication often generates greater amounts of uninhibited speech. Research on flaming, net.sleezing, emoticons, and hate messages (Kay & Sobnosky, 1989; Kiesler, Siegel, & McGuire, 1984; Reid, 1991; Steinfield, 1986) would seem relevant to GDSS communication also.

Number of comments. Research has also generally shown an increased number of comments in GDSSs as opposed to manual meetings (Gallupe et al., 1988; Steeb & Johnston, 1981). The computer conferencing literature generally supports this finding as well, with several studies reporting an increased number of comments (as compared with

traditional meetings) spread evenly among group members (Hiltz, Johnson, & Turoff, 1986; Kerr & Hiltz, 1982; Williams & Rice, 1983). However, Turoff and Hiltz (1982) found contradictory results on a computer conferencing system.

Rationale and Hypotheses

Based on the literature reviewed above and the rationale below, two hypotheses are advanced. One way in which members may try to influence the decision-making process in traditional group meetings is by dominating discussion or putting forth more verbal comments (Falk & Falk, 1981). However, GDSSs allow everyone to "input" at the same time. As the literature reviewed above suggests, this does not allow any one or collection of organizational members to control the discussion. While the number of typed electronic inputs should not differ among individuals, the type of inputs will. Kipnis, Schmidt, Swaffins, and Wilkinson (1984) reported that individuals who see themselves as powerful use a larger variety of influence strategies. Because the GDSS does not seem to limit influence bidding, we should expect to see similar patterns here. Zigurs' (1987) findings that GDSS may allow for some types of influence and that influence strategies composed a substantial portion of total "talk" for GDSS members is relevant here as well. Thus, it was posited

that influence rating and influence strategies will be related such that:

H1: Controlling for total inputs, pre-meeting ratings of influence will be positively related to the frequency of influence strategies.

H2: Individuals with high pre-meeting ratings of influence will differ from individuals with low pre-meeting ratings of influence on the distribution of influence strategies used.

Methodology

Subjects

Twenty-eight groups, ranging in size from 4-14 members (mean = 7.2) were used in the study. The total number of subjects was 201. Seven group were from a faculty/administrative department (n = 46), six were from student clubs or organizations (n = 46), fourteen were from classes using groups for various activities (n = 104), and one was from a corporation (n = 5). All participants (50.8% males, 49.2% females) came from a major metropolitan area in the southwestern United States. On average, the members had been part of the group being studied for 1.9 years. Only intact groups who have had some experience working together previously were utilized.

Research Variables

The independent variable was a perceived rating of influence for each individual. Subjects rated five pre-assigned members of the group, including themselves, on two, seven-point Likert-type scale items regarding that person's influence in the group. The scale was developed by the researcher and is similar to one employed by Hurwitz et al. (1968). To obtain each member's rating, all group members' ratings for that person were summed.[1]

The total number of typed electronic inputs was measured by a count of the coded meeting transcript. Three separate counts were used: (a) every string of words before a return on the keyboard, (b) every word separated by a space, and (c) every coded act. Additionally, the transcripts were coded by two trained raters using an inductively derived coding scheme developed by the raters and researcher. The unique nature of the meeting transcripts produced in the current study meant rejection of several coding forms currently in the literature (see, for example, Bales, 1950; Crowell & Scheidel, 1961; Putnam, 1981; Wiseman & Schenck-Hamlin, 1981); however, these other coding schemes did help inform the creation of the one used. The items were generated from the transcripts of a sample group that took part in the study prior to actual data collection. This coding scheme classifies typed

comments initially into one of eight categories: statements, placement/priority, suggestions, justifications, agreement, disagreement, questions, and other. Acts could also be coded as positive or negative for socioemotional content. Additionally, remarks with added emphasis were coded as such. Influence strategies were broadly operationalized as all those messages that were more than a type of statement. Thus, influence strategies included all items except those coded "statement" or "other."

In order to establish inter-rater reliability, several hours of training with the coders was conducted. This included a coding manual explaining the procedure, categories, rules for classification, and a sample coded transcript. Each of the coders also practiced on the transcripts from the sample group that took part in the study prior to actual data collection. After this, the two raters coded identical transcripts from the first group meeting to assess agreement. Having done so, they then began coding transcripts separately. The raters met once weekly for three weeks to work together on a single transcript to help ensure parallel thinking. They were rated again at the end of the experiment to verify inter-rater reliability.

Technology

The Electronic Boardroom consists of 14 stations with a terminal and keyboard arranged around a conference table. A public viewing screen is at the front of the room, and a facilitator to help administer the meeting is also present. Comments are made anonymously, and use of the equipment requires only minimal training. The software tools used were Topic Commenter, in which comments regarding each item in the task were entered, and Voting, in which the ranking of the task items took place.

Procedures

All participants followed the same set of procedures. Participants were informed that all comments were anonymous, and instructed to use the GDSS for interaction and to follow the meeting agenda, a copy of which was located at each terminal. Instructions regarding the group task were given. Participants were quickly trained on how to use the GDSS.

Participants began the 75-minute meeting by completing the pre-meeting influence questionnaire and individually ranking the task items. The group then began electronic discussion of each of the ten items associated with the task. The electronic discussion was viewed on the public screen and was available on each person's terminal. After 25 minutes of inputting comments and reading others'

remarks, an initial vote was taken. Electronic discussion was then reopened for 15 minutes after a brief analysis of the vote, and followed by a final vote. A debriefing was then performed by the researcher.

Task

In an effort to create a task that groups would perceive as both useful and similar to activities with which they often are involved, the task focused on budget cuts at the group's organization (the university for most of the groups). Ten generic items were included on the list of targeted items. The task asks participants to prioritize the items from most valued (last to be cut) to least valued (first to be cut).[2]

Results

Reliability

A correlation matrix of the two influence rating questions for all combinations of self and other reports was computed in order to assess internal agreement for the pre-meeting ratings.[3] The high, positive correlations were indicative of a reliable measure of pre-meeting influence.

Scott's (1954) pi was used to assess the inter-rater reliability between the two coders. An initial score of .82 was obtained between the two for coding completed separately. Following several meetings to compare notes and resolve differences, reliability was assessed again at

the end of the coding process. On codings completed separately, a pi of .78 was achieved, suggesting that the coders had maintained an adequate degree of consistency over the course of the study.

Hypothesized Relationships

Hypothesis 1 posited that pre-meeting rating of influence would be positively related to the frequency of influence strategies when controlled for total inputs. As operationalized above, influence strategies included nine of the eleven coded message categories, and total inputs could be measured by total words, total strings, or total coded acts. A Pearson correlation between pre-meeting influence rating and influence codes adjusted for total input revealed mixed results. When influence codes were divided by total strings, a positive and significant coefficient resulted (r = .155, r^2 = .024, p = .014), but effect size was small. However, when dividing the influence codes by total acts (r = .115) or total words (r = -.022), insignificant coefficients resulted (see Table 1). Thus, Hypothesis 1 is supported with qualifications.

Hypothesis 2 posited that individuals high in pre-meeting rating of influence would differ from those individuals low in pre-meeting rating of influence on the distribution of influence strategies used. The chi square used to test this hypothesis makes an adjustment for the

expected frequency of each message category, so no additional adjustments were made.

First, a chi square was computed for all eleven message categories. A significant difference between the two groups on overall message strategy was obtained ($X^{2(10)}$ = 24.744, $p < .01$). In testing the hypothesis, a significant discrepancy between the use of influence strategies by the two groups was recorded ($X^{2(8)}$ = 22.569, $p < .005$) (see Table 2). Furthermore, use of non-influence categories by the two groups was not different [$X^2(1) = 0$, p = NS]. Thus, Hypothesis 2 is supported.

Message Codes

Additional t tests comparing high and low influence individuals on various message strategies revealed several significant findings. First, high influence individuals used significantly more words [$t(139) = 2.67$, omega^2 = .042, $p = .008$], strings [$t(139) = 2.00$, omega^2 = .021, p = .047], and acts [$t(139) = 2.28$, omega^2 = .029, $p = .024$] than did the low influence subjects. These variables explain approximately four, two, and three percent, respectively, of the variance between high and low influence individuals. Low influence members did use a greater percentage of statements [$t(139) = -2.23$, omega^2 = .027, $p = .027$] and a greater percentage of suggestions [$t(139) = -2.13$, omega^2 = .025, $p = .035$], each of which

accounts for two to three percent of the variance between high and low influence individuals. High influence members used a greater raw amount of total justifications [$\underline{t}(139) = 2.37$, $\text{omega}^2 = .032$, $\underline{p} = .019$], and a greater percentage of questions ($\underline{t}(139) = 2.02$, $\text{omega}^2 = .021$, $\underline{p} = .045$]. These two differences account for approximately three and two percent, respectively, of the variance between high and low influence individuals (see Table 3).

Discussion

Based on the results of this study, several conclusions can be made. Although the qualified support for Hypothesis 1 suggests that the higher the influence rating, the more likely one is to use influence strategies in his or her message choice, given the small effect size and the fact that other methods of adjustment for total input produced insignificant results, such a conclusion may be ill-founded. A more accurate conclusion is that both high and low influence individuals use influence strategies, but in different ways. Support for Hypothesis 2, that high influence and low influence individuals would differ on the distribution of influence strategies used, further backs this claim. Low influence individuals use more suggestions for what the group might do. High influence individuals use more justifications and ask more questions in their attempt to influence group thinking. No

difference was found in the use of agreements/ disagreements, positive/negative socioemotional, or the use of added emphasis.

In attempting to explain this, first, it should be recognized that low influence individuals used a larger percentage of statements. The statements category was specifically left rather broad to capture a number of general fact or value remarks that really did not seem to be actual influence attempts. Low influence individuals did, however, use a larger percentage of suggestions than their high influence counterparts. These were typically group-oriented actions that could be taken to deal with the problem at hand. Exact examples of such remarks by low influence individuals (with group and user number in brackets) include the following:

"Let's evaluate and if there is someone we can do with out replace them" [10-13]

"We need to change the system" [9-2]

"We need to support our present staff members" [10-4]

"All right gals, kill the management and up the facilities one" [6-4]

"Don't let employees feel 2nd-fiddle" [4-6]

"THINK AGAIN" [9-1]

As these examples illustrate, suggestions were typically

made for other group members, and plural pronouns such as "we," "our," and "us" were often used. In other cases, the recipient was more implied.

High influence members, on the other hand, tended to use more total justifications for their remarks. Operationalized as reasoning, proof, explanation, or support of another remark, justifications seem to represent a rationale for another statement or course of action. The high influence individuals may have used these to help draw logical support for their desired order of the items. Examples (with corresponding statement where necessary and group and user number in brackets) included the following:

> ..."since management (good management) and productivity are closely related" [12-12]
>
> ..."because it can be taught in a large (120-size) and get double credits" [13-3]
>
> "thats why they want to teach it" [13-14]
>
> [Insurance benefits should be higher in the priority and maybe even switched with salary cuts.] "We lose money with salary cuts, but we lose more with out the benefit of insurance" [5-12]
>
> [This is important to also help keep our people healthy.] "Good health benefits make it possible for care before staff becomes too ill" [13-14]

..."because if we are not serving customers there is not real need to exist" [12-2]

Additionally, the high influence individuals used more question asking. While this was occasionally an actual call for clarification, it was often used to feel out other members of the group to assess where they stood. It may very well have been an attempt by the members to assess whether or not they were influencing others' thinking. Examples of this type included the following:

"ARE WE UNANIMOUS ON THIS SELECTION? (Y/N)" [5-2]

"do we think we think it is better to keep the salaries and possibly loose positions" [3-14]

"why is this the last choice?" [11-13]

"but if we are in agreement, why is this ranked lower that "Services Offerred Customers?"" [11-2]

"Service to who? The ignorant?" [4-14]

"Who was the smarty pants who put this #7???" [4-5]

In some cases the comments seemed directed at specific others. Additionally, the wording was often rather strong, perhaps indicating the seriousness of the question.

The added emphasis category, which consisted primarily of all capitalizations or repeated punctuation marks, was not used differently by the two groups. Moreover, agreements, disagreements, positives, and negatives, were

used similarly by high and low influence individuals as well. Several comments can be made in regard to this finding. First, use of the GDSS seemed to help reduce open attacks. Conflict was depersonalized to some extent and thus never really seemed to develop. This may have been due to the nature of the task also. This may partly explain the minimal use of disagreements and negative remarks. Second, these five categories may represent more of the socioemotional side of the meeting rather than the task-oriented nature of the interaction. This should not be overly surprising considering the way in which they were operationalized. Socioemotional messages and influence messages regarding the task are likely different. Finally, the added emphasis category may well have been particularly affected by a group-level interaction. In several instances, as soon as one person discovered he or she could use this, others appeared to have caught on to the unique visual effect this created. This result seems to be similar to the bandwagon effect discussed by Steinfield (1986) in his review of computer-mediated communication systems. It would be interesting to note who initiated such message behavior; however, the nature of the meeting transcripts prohibited this.

One of the seemingly more contradictory findings was that the GDSS did not facilitate equal discussion among

group members. This was measured with total words, character strings, and coded acts, each of which produced significant results. Past research, which often used equal participation as a measure of influence, has tended to support the claim that the GDSS allows everyone to participate equally. Indeed, since all members had their own keyboard and terminal and since no one had to wait for another's speaking turn to end before beginning his or her own comment, the GDSS does allow for equal participation; but in reality, this was not how it was used. High influence individuals used more words, character strings, and coded acts. Just as "speaking up" more may well have been their preferred strategy in face-to-face meetings with the group, it seemed an appropriate strategy here to input as much as possible. While clearly different skills were needed to express more content in a GDSS meeting, the high influence people appear to have made the adjustment fairly quickly. Why does this finding differ from other GDSS research findings? Most of the prior research has compared GDSS to face-to-face or manual groups. While support was found that the participation was more equal in a GDSS meeting, no internal member differences in the GDSS groups appear to have been examined. Additionally, much of the prior research was done on three- and four-person groups. The variations in comments of larger groups may be

different in a GDSS meeting. Also, the use of groups with a past history would add to this distinction. Zero-history groups formed only for the purpose of the study may do more reciprocation of one another's responses, which would lead to similar levels of total input.

The coding scheme itself was not without problems. However, it did seem to work for the nature of this study. Most other coding schemes focused on procedural messages, argument sequences, or compliance gaining techniques. The anonymous, random order of the comments, and the task nature of their content in the GDSS meeting demanded a different classification system. In creating one, the operationalization of influence categories was difficult. This was due in part to the fact that it was difficult for coders to assess when a group member was trying to be influential. It was also nearly impossible to connect arguments together on the meeting transcripts. A response to a previous item could not be directly traced or readily inferred. Comments also had no intended recipient in most cases. These difficulties point out problems in the classification of GDSS comments to the coding scheme developed for this study. The inability to identify a comment sender, the frequent inability to sort through all remarks made on any given topic due to total frequency of comments, and the general inability to assess others

reactions to your comment through immediate feedback all seemed noteworthy and are deserving of further exploration. As Kiesler et al. (1984) have noted, we must discover how "groups work out new communication traditions and rules; and what the requirement of the new communication culture will be" (p. 1127). Doing so may lead to a better understanding of not only different influence strategies used in a GDSS meeting, but alternative message strategies altogether.

One observation of the meetings was that many individuals were so busy typing in their own comments that they took little time to view others'. If it was the high influence individuals who did this, then they may have been ignorant to other worthy comments that had been input. This may also help explain their need to assess what the group was thinking with question-asking messages.

Additionally, the nature of the GDSS meeting interaction deserves some attention. Electronic discussion differs from face-to-face interaction in several important ways. Sequencing of messages is difficult to follow since all comments are entered into the system in the order they are input, rather than as part of a continuing dialogue or argument sequence. This important difference clearly seems to affect ability to interrupt others, change topics, offer

timely feedback, and answer questions, all of which are important in the group interaction process.

Limitations

As a result of choosing certain alternatives along the way, several limitations exist to this study. Originally, organizational groups (see Putnam, 1983, 1988) were targeted for this study. When inadequate samples were obtained, the sample was enlarged to all task group types regardless of whether or not they were embedded in a larger organization. Furthermore, targeting groups from a Western, largely Caucasian-based student population may well have provided results unique to a single culture.

In choosing to look just at individual differences on a GDSS, important comparisons with other methods of group meetings (e.g., structured face-to-face, unstructured face-to-face) were not explored. A design that compared members across meeting modes may have been even more revealing.

The task chosen for this study was limiting in several ways. Because it was generated for this study, it had not been tested on previous groups, except for one pilot group immediately prior to the beginning of the study. Another limitation is that the task was timed so that all members were on the GDSS for an equal length; however, doing so may have represented an unnatural constraint on the group members. The design of the task also forced the group to

use interaction techniques with which they may not have chosen to use otherwise.

A final limitation is that all members were interacting on the GDSS for the first time. Time constraints prohibited the use of an actual warm-up task to facilitate familiarization in using the system. Training was provided, but was very brief.

Directions for Future Research

The discussion and limitations suggest several areas for future GDSS research. As mentioned, organizational groups should be studied in future GDSS research since they have not received much attention and are more generalizable to the organizational context. Additionally, designs that allow groups to work on their own task would provide the necessary motivation to ensure active GDSS participation.

A more longitudinal design would also be useful in exploring how influence strategies shift over the course of using a GDSS. It may be that use over time reduces communicative influence strategies. Conversely, interaction over time may lead to recognizing communication patterns typical to certain individuals. These speculations represent a rich area for future research given the evolving nature of group interaction and the unique communication channels available in a GDSS.

Future research should examine more individual-level differences. The existing GDSS literature gives us some indication about how GDSSs and face-to-face groups compare, but we still have minimal information on how different GDSS users compare to one another. Communication competence, for example, in a computer-mediated communication system such as a GDSS may have especially important implications. An examination of the skills, motivation, and knowledge necessary for competent interaction (Spitzberg, 1983) in a GDSS may offer insight into who will wield the most influence and who will use what strategies for influence in this type of meeting environment.

Cross-cultural comparisons should lend interesting insight into the GDSS process also. Individuals from cultures that are highly status conscious, such as Japan, may have difficulty communicating on such a system. Not being able to attribute messages to specific individuals may have the effect of decreasing participation due to a lack of cultural appropriateness, rather than increasing participation by allowing everyone to express their views. However, other cultures may find ways to adapt to the unique features of GDSSs by tagging comments or suspending cultural norms temporarily.

As we continue to explore the communicative implications of GDSSs, we may need to turn to more

receiver-based issues. First, what types of remarks prompt feedback? In a GDSS environment where there is no nonverbal feedback, some form of written feedback becomes even more important. Responses to statements or questions may inform us on the development of a group decision on such a system. Second, how important is reading other's information? How frequently must reading be done to facilitate effective decision making? Just as listening is so crucial to face-to-face interaction, reading the comments made by others in the group seems vital to actual group interaction. Yet, very little has been done to assess such issues. Third, when should face-to-face interaction be used to supplement GDSS meetings? How does use of a GDSS affect subsequent face-to-face communication? In many cases, the GDSS is not designed to entirely replace face-to-face, oral communication; instead, it is available to supplement it as needed. As Saffo (1990) noted, the real power of such systems may be in supplementing the face-to-face context.

At the outset of this argument, it was suggested that the GDSS represented a state-of-the-art, technological aid in the age-old attempt at improving decision-making effectiveness. As decision-making groups and problem-solving units are the basis for most organizations, the implications of this new technology are clearly relevant in

this context. This study has hopefully added to that effort by focusing on the communicative influence strategies of high and low influence member as key individual differences in a GDSS meeting.

Notes

[1]In the groups containing only four members, the midpoint value (4) was added in as a fifth response since summed ratings were used. This represents a conservative approach and was only used with sixteen of the two hundred one subjects.

[2]The task used contained 10 general budget areas to be prioritized: (a) employee development and education program, (b) fringe benefits other than insurance, (c) insurance benefits, (d) middle management/administrative level job positions, (e) new job positions, (f) planned expansion of facilities, (g) salaries for all present employees, (h) services offered to customers, (i) supplies and materials, and (j) support staff positions.

[3]The original measure for the pre-meeting rating of influence contained three items assessed by self and four other group members. An examination of the items revealed that the second question, "I am influenced by this group," was apparently not related to the other two items in the way originally intended. Subsequent correlation analysis confirmed that the question was negatively related to both question one ($r = -.330$, $p < .001$) and question two ($r = -.359$, $p < .001$) when appropriately scored. Consequently, the item was dropped from the scale.

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Table 1

Correlation Coefficients Between Pre-Meeting Influence Rating and Adjusted Influence Message Strategies

	Influence Messages Adjusted for Total Words	Influence Messages Adjusted for Total Strings	Influence Messages Adjusted for Total Acts
Pre-Meeting Rating of Influence	-.022	.155*	.115

Note. All tests one-tailed. $N = 201$.

*$p \leq .05$.

Table 2

Distribution of Influence Messages

Message Type	High Influence (n = 71)	Low Influence (n = 70)	TOTALS
Placement/ Priority	111	79	190
Suggest- ions	304	307	611
Justifi- cations	429	315	744
Agreement	69	47	116
Disagree- ment	7	13	20
Question Asking	242	156	398
Positive Socio- emotional	71	48	119
Negative Socio- emotional	11	16	27
Added Emphasis	157	107	264
TOTALS	1401	1088	2489

Note. All figures rounded to nearest whole number. (X^2 = 22.569; d.f. = 8; $p < .05$).

Table 3

Significant T Tests Comparing High and Low Influence Individuals on Message Use

Item	High Influence Mean (n = 71)	Low Influence Mean (n = 70)	T Value	Sign. Level
Words	339.296	270.400	2.67	.008**
Strings	15.873	13.714	2.00	.047*
Acts	33.394	27.643	2.28	.024*
Statements Adjusted for Total Words	.051	.057	-2.23	.027*
Suggestions Adjusted for Total Words	.012	.018	-2.13	.035*
Justification	6.042	4.500	2.37	.019*
Questions Adjusted for Total Strings	.210	.142	2.02	.045*

Note. N = 201.

*$p \leq .05$. **$p \leq .01$.